

## Technical data sheet

### DIPLAST<sup>®</sup> TM/ST

Version: June 2015

<b>Chemical composition</b>	Tri-2-ethylhexyl trimellitate (TOTM or TEHTM) containing antioxidant
<b>CAS number</b>	3319-31-1
<b>EINECS number</b>	222-020-0

#### Specifications

Characteristics	Unit	Value	Test method	
Density at 20°C	g/cm <sup>3</sup>	0.987 - 0.990	GM 012	ASTM D 4052-96
Refractive index n <sub>D</sub> <sup>20</sup>		1.485 - 1.487	GM 020	ASTM D 1045-95
Colour	Pt – Co	80 max.	PL02F	ASTM D 1045-95 ASTM D 1209-00
Acidity	mgKOH/g	0.1 max.	PL02C	ASTM D 1045-95
Water content	%	0.1 max.	GM 010	ASTM E 203-96
Ester content	%	99.5 min.	PL10C	G.C.

**DIPLAST<sup>®</sup> TM/ST** is a pale yellow liquid, anhydrous, clear and free from matter in suspension. It is soluble with common organic solvents but insoluble with water and miscible with most of the plasticizers used in processing PVC.

#### Liquid Properties

Temperature (°C)	Brookfield Viscosity LV DVII+ (mPa·s)
0	1600
10	660
20	310
30	160
40	90
50	55

  

Volume resistivity at 23°C (ASTM D 1169-95)	5·10 <sup>11</sup> Ohm·cm
Boiling point (760 mmHg)	430°C
Fogging DIN 75201 reflectometric (3hours at 100°C)	>95%

The figures above are typical values and are not intended as specification limits. For further information on the characteristics and properties of **DIPLAST<sup>®</sup> TM/ST** in the liquid state, see the relevant EC-standard Materials Safety Data Sheet.

The product **DIPLAST<sup>®</sup> TM/ST** due to its nature does not have a shelf life. However it can be stored in appropriate containers at a temperature of approximately 25°C and the exclusion of humidity for at least 1 year, without losing its chemical properties.

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## Characteristics and applications of trimellitates

PVC plasticizers based on Polynt Trimellitic Anhydride (Trimellitate plasticizers) offer to users and compounders many of the performance advantages of both Polyester and Phthalate plasticizers. Trimellitate plasticizers show a unique balance of properties that can be summarized as follows:

- **Processability and efficiency**  
Comparable with those of many Phthalate plasticizers and better than most Polyester plasticizers.
- **Permanence at high temperatures and retention of mechanical properties.**  
Trimellitate plasticizers provide the same or even better performances than Polyester plasticizers.
- **Low temperature flexibility**  
Unlike Polyester plasticizers, Trimellitate plasticizers provide good flexibility at low temperatures.
- **Permanence and compatibility**  
Trimellitate plasticizers are more permanent than many other plasticizers. They are extremely resistant to extraction by aqueous soap and have an excellent compatibility under high humidity. The migration resistance in PVC compounds when in contact with a wide range of materials is much better than phthalates and other monomeric plasticizers and comparable to Polyester plasticizers.

## Characteristics and applications of DIPLAST® TM/ST

**DIPLAST® TM/ST** can be used in a wide range of applications for such as:

- PVC compounds for the production of high temperature cables according to European and International standards like BS 6746, VDE 0207, UL 62 etc.;
- vinyl sheets for car interior components required to meet stringent “windscreen fogging” specifications. The easy processability of **DIPLAST® TM/ST** can be exploited for manufacturing articles by slush moulding technology;
- various compounds: foils, profiles, shoes, gaskets, etc. which have to exhibit special requirements such as heat resistance, low volatility, low migration tendency. **DIPLAST® TM/ST** can also be used as a base stock for synthetic lubricating oils.

## General properties in PVC compounds

The properties of **DIPLAST® TM/ST** were evaluated using the following formulation:

Formulation	1 (parts by weight)	2 (parts by weight)	3 (parts by weight)
PVC K70	100	100	100
Plasticizer	50	47	47
Ca/Zn	1.2	12	8
CaCO3	-	15	15
Stearic acid	0.3	----	----
Calcium stearate	-	0.5	0.5

The specimens were prepared by calendering and moulding to obtain the thickness required for the different test methods.

## Results

	Test method	DIPLAST® TM/ST (1)	DIPLAST® TM/ST (2)	DIPLAST® TM/ST (3)
<b>Shore “A” hardness</b>	ISO 868	88	--	--
<b>Shore “D” hardness</b>		--	41	41
<b>Cold flex °C (Clash &amp; Berg)</b>	ISO/R 458	-20	-12	-12
<b>Solution Temperature °C (*)</b>	DIN 53408	140.5		
<b>Extraction resistance</b>	ISO 175			
-% weight loss-(48h at 70°C)				
• Water		-0.1		
• Aqueous soap 1%		-0.1		
• Olive oil		-3.5		
• Mineral oil		-2.8		
• n-Hexane (24hours at 23°C)	-27.8			
<b>Volatility (7days at 100°C)</b>	ISO 176	-1.1		
<b>Rheological properties</b>				
• Dryblending time 83°C (Mixer P-600 : 100 RPM)	Brabender Plasticorder	5'15"	4'00"	4'00"
• Gel time 88°C (at max torque) (Mixer W-50; 40 rpm; 48gr)	Brabender Plasticorder	9'45"		
• Fusion Temperature (°C) (Mixer W-50, 5°C/min, 40Rpm)	Brabender Plasticorder	118.5		

(\*) Solution temperature determined with dispersion of resin: two grams of PVC are placed in 48 grams of plasticizer and the solution is heated at 1°C/min.

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## Properties in PVC compounds for cables

**DIPLAST® TM/ST** enables high temperature cables to be produced.

As a technical information, the following results are quoted:

Test conditions	Formulation 2 specimen thickness 1mm	Formulation 3 specimen thickness 1mm
<b>ORIGINAL SPECIMENS:</b>		
Tensile strength MPa	21.5	21.8
Elongation at break %	293	293
Modulus 100%	14	14.5
Cold Flex °C (clash & Berg)	-12	-12
Thermal stability at 200°C h (Min. value 120 minutes)	6	---
<b>AFTER AGEING CONDITIONS:</b>		
<b>SPECIMENS AGED 14 days at 140°C VDE 0207 YI8</b>		
Tensile strength Variation % ( $\pm 25\%$ max)	0.0	
Elong at break Variation % ( $\pm 25\%$ max)	-11.3	
Modulus 100% Variation %	+18.6	
Cold Flex °C (Clash & Berg)	-3.39	
Cold Flex Variation %	-10	
Weight loss (mg/cm <sup>2</sup> )	-16.7	
<b>SPECIMENS AGED 10 days at 130°C</b> <b>Accelerated ageing test for class II ISO 6722</b>		
Tensile strength Variation %		-3.2
Elong at break Variation %		-3.8
Modulus 100% Variation %		3.4
Cold Flex °C (Clash & Berg)		-11
Cold Flex Variation %		-8.3
Weight loss (mg/cm <sup>2</sup> )		-1.21

In the tests, compounds were aged in an oven with forced ventilation.

In case of more severe requirements, we suggest the use of **DIPLAST® 8-10/ST**, trimellitate obtained by a blend of linear alcohols C<sub>8</sub>-C<sub>10</sub>.

*The information contained here is correct and accurate and is based on our technical and scientific knowledge at the date of going to press.*

*Such information is, in all cases, relevant only with respect to the product as used in its pure state and only for the uses referred to in this publication.*

*Nothing stated here may be taken or construed as implying a breach of existing patents.*

*No warranty, either expressed or implicit, is given with regard to the results to be obtained from using this information.*

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